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Investigations of heat transfer and hydrodynamics in the drop-shaped heat exchange intensifiers for use in the aerospace industry

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Abstract

© 2016, International Journal of Pharmacy and Technology. All rights reserved.The increase of heat exchanger pipes thermal efficiency is very important for aerospace industry. Moreover, not only the thermal efficiency increase, but also the energy costs for heat-transfer pumping have a great significance. Therefore, the heat transfer intensifiers in the aerospace field are evaluated by the integrated index: thermal-hydraulic efficiency. For today, a wide variety of heat exchange intensifiers was developed. The drop-shaped intensifier that has streamlined aerodynamic shape, to reduce hydraulic losses for heat-transfer pumping is considered in this work. This paper presents the results of numerical modeling of heat transfer process using drop-shaped intensifier. Also there is given the comparative analysis of thermal efficiency of drop-shaped intensifier with ring intensifiers and smooth pipes, as well as the comparison of hydraulic resistance increase. The researches were carried out at a turbulent flow in the range of Re numbers from 3000 to 80000. The use of drop-shaped intensifiers can improve thermal efficiency in the whole range of studies, compared to smooth pipes, at a moderate growth of hydraulic resistance over the entire range of Re numbers.

Keywords

Drop-shaped, Engineering, Flow structure, Heat transfer, Intensifier, Modeling, Simulation, Turbulence flow